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Cartographic Development Index (CDI): international cartographic evaluation

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Cartographic Development Index (CDI) : international cartographic evaluation

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Abstract

National cartography is indispensable for territorial development and delimitation. An adequate cartography possesses identifiable characteristics, notably complete coverage adapted to the topography, appropriate scales, current information, specific themes, availability and accessibility. A Cartographic Development Index (CDI) has been constructed to measure such characteristics on an international scale, to permit an appreciation of cartographic reality in different countries. This index facilitates international comparisons, the identification of strengths and weaknesses, as well as the suggestion of corrective measures. This approach measure the complex situation of 126 countries using a universal, standardized and reliable index.

Key words: Cartographic development Index (CDI), Developing Countries, Africa, Latin America, Asia, cartography, analysis.

Introduction

Cartography constitutes a source of information inherent to a multitude operations. We note, however, that the cartographic production of a nation is complex to evaluate. In order to offset this problem, a cartographic survey has been realized and a Cartographic Development Index (CDI) has been produced.

The CDI (Cartographic Development Index), which permits a characterization of the cartographic production of a country, while exploiting the metadata of the survey. The CDI is a numerical value that simultaneously considers five factors, allows for the establishment of comparisons, the

extraction of similarities and differences as well as the facilitation of the identification of the causes affecting the state of the cartographic health[1]

Cartographic Survey

The cartographic survey's primary[2] focus in developing countries (DC), meaning 126 countries spread out over three large regions have been studied ("Africa", Latin America and the Caribbean" and "Asia/Middle East"). The survey is of interest as it draws up the cartographic profile of each of the countries concerned. For each country, we find a descriptive sheet comprised of two sections: one specific to its cartography an the other general. The cartographic survey comes from a synthesis of several documents, those of Böhme (1991), Larsgaard (1993), Parry and Perkins (1987), national surveys, IGN (National Geographic Institute), internal documents and the OS (Ordnance Survey). It is thus easy to recall a cartographic realization, to know the producer, the scale, the production period and the number of sheets for a given series[3].

The general portrait presents the surface of the country, the population, the date of independence, the last foreign country during the colonial period, the principals exportations and the number of census (dates).

Methodology

The CDI combine five parameters (table 1) and produces a numeric type value (%), which varies from 0 (weak) to 100 (strong). It must be stresses that a different importance has been accorded with parameters[4] (relative weight, right side of table 1).

The employed methodology rests on the classification of five parameters and the integration of each class's values in this formula :

$$IDC = (((Surface * 0,40) + (Periods * 0,30) + ((Scales * 0,20) + (Themes * 0,05) + ((Accessibility * 0,05)) / 4,45) * 100$$

For each of the parameters a method of classification has been fixed (table 2). Thus, the Surface cartography is classified in five classes, varying between less than 100% coverage to greater than 300%. Following

[1] The term "state of cartographic health" or "health of world mapping" is taken form Parry and Perkins during the 1991 ICA congress.

[2] With the goal of avoiding spatial discontinuities, certain countries not included amongst developing countries were still considered.

[3] The survey is not mean to be exhaustive because it results from external sources, however the verifications carried out permits the verdict that it faithfully represents the cartographic context.

[4] This approach is subjective but proceeds from the application of correlation tests as well as discussions of map-makers. For further details, refer to articles Baudouin 1998 and Baudouin et al., 1998.

this, an ordinal value is associated with each class (from 1 with the number of classes), according to the considered parameter. After we take off one unity (-1) from each class (for the weak class it's the equivalent of a multiplication by 0). From the set of classified parameters, we obtain five ordinal values, which integrated and transposed into percentages.

Parameter **Associated Characteristics**	**Importance (Relative weight)**
Surface charted Summation of topographic coverage 1:10 000 - 1:250 000	**40%**
Production **Periods** [before1960[[1960 and 1980[and [after 1980]	**30%**
Scales Diversity [1:10 000 - 1:50:000[[50 000 - 1:250 000[and [1:250 000 et +]	**20%**
Number of **Themes** Widely diffused documents. Limited-diffusion publications not considered	**5%**
Document **Accessibility** Usage of t Accessibility grid produced by Parry et Perkins (1987)	**5%**

Table 1: List of parameters and relative weight accorded.

Parameter **Limit of classes**	**# of classes**
Surface charted [Less than 100%[[100% to 150%[[150% to 200%[[200% to 300%[and [300% and more]	5
Production **Periods** Triangular graphic	6
Scales Diversity Triangular graphic	5
Number of **Themes** Number of themes: [1-5[[5-10[[10-15[et [15 and more]	4
Document **Accessibility** Level of constraint: [very strong] [strong] [medium] [weak] [none]	5

Table 2: Limit of classes parameters.

Example

Let us examine the case of Bolivia. The Surface covered is rated 4 (which is very good), the periods of Production is 5 (which is excellent), the diversity of Scales is 4, the number of Themes is 4 and finally, Accessibility is ranked at 5. This translates into the formula thusly:

CDI Bolivia=(((3 * 0,40) + (4 * 0,30) + (3 * 0,20) + (3 * 0,05) + (4 * 0,05)) / 4,45) * 100

CDI Bolivia = (3,35 / 4,45) * 100

CDI Bolivia = 75,28 %

Results

Each of the countries is treated in this manner. The map at the second next page (Figure 1) illustrates the distribution of the CDI by equal section of 20%. The total average of the 126 countries is 59,40% (standard-deviation 21,36%), the average of Africa average is 52,10%, Latin America and Caribbean is 57,91% (variations of 20%), and Asia /Middle East is 69,91%. The tables 4, 5, and 6 presents the details for each country.

Regions	Minimum CDI	Maximum CDI	Average
Africa	15,73%	89,89%	52,10%
Latin America and Caribbean	11,24%	87,64%	57,91%
Asia/ Midle East	15,73%	98,88%	69,91%

Table 3: Score of the CDI by region.

Conclusion

Several criteria (Figure 2) influence the cartographic evolution of a country; we have identify four large families of criteria; which is to say the political, economic, geographic and technology aspects. According to the country in question, its political and historical antecedents, amounts available, the context work together to make the resulting CDI value weak, average or strong. The introduction of new technologies will surely facilitate the cartographic production of numerous countries, however technological appropriation remains a difficult problem to overcome.

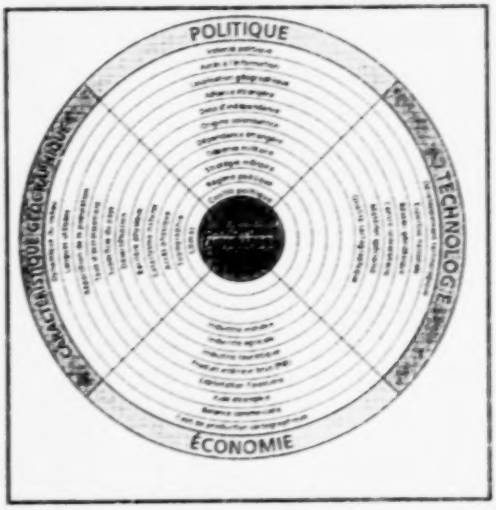

Figure 2:

Factors in cartographic development.

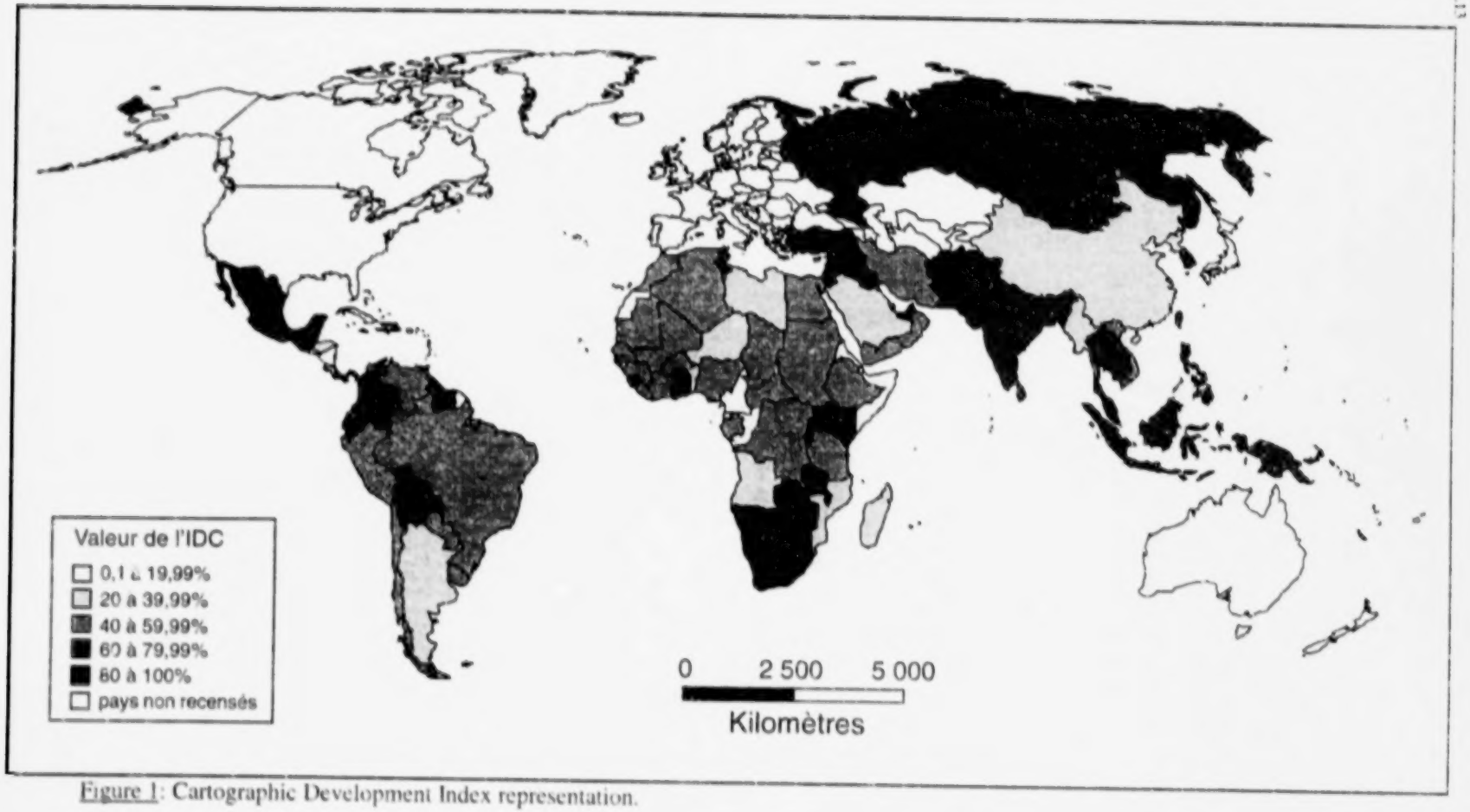

Figure 1: Cartographic Development Index representation.

Pays	Superficie	Date	Échelle	Thématique	Disponibilité	IDC
Cameroun	2	1	2	2	2	15,73
Congo	2	1	2	2	2	15,73
Somalie	2	1	3	1	1	17,98
Libye	1	4	1	1	1	20,22
Guinée Bissau	2	1	4	1	1	22,47
Bénin	3	1	2	1	4	25,84
Guinée Equatoriale	3	1	3	1	1	26,97
Mozambique	3	1	3	1	1	26,97
Niger	2	2	3	1	4	28,09
Madagascar	3	1	3	2	3	30,34
Angola	2	4	2	1	1	33,71
Djibouti	2	4	2	1	4	37,08
Ethiopie	2	5	2	1	1	40,45
Mali	2	4	3	1	4	41,57
Mauritanie	2	4	3	1	4	41,57
Côte d'Ivoire	3	1	5	2	5	41,57
Soudan	2	4	3	1	5	42,70
Tchad	2	4	3	2	4	42,70
Cap Vert	2	4	4	1	3	44,94
Republique Centrafricaine	2	5	3	2	2	47,19
Tanzanie	3	2	5	1	5	47,19
Gambie	2	4	4	2	5	48,31
Egypte	2	6	2	2	2	48,44
Sénegal	2	5	3	2	5	50,56
Comores	2	4	5	1	5	51,69
Burkina Faso	2	6	2	1	5	51,69
Moyenne 52,1%						
Gabon	2	6	3	1	2	52,81
Algérie	3	5	2	2	4	53,93
Nigeria	4	1	6	2	4	53,93
République Démocratique du Congo	1	5	6	2	4	53,93
Guinée	4	1	6	1	5	53,93
Maroc	3	4	3	3	5	53,93
Liberia	3	5	3	1	5	58,43
Tunisie	3	6	3	1	2	61,80
Botswana	4	4	3	2	5	61,80
Kenya	4	4	3	2	5	61,80
Zambie	4	5	2	2	5	64,04
Ouganda	3	4	6	2	4	65,17
Namibie	3	4	6	1	5	65,17
Sao Tomé et Principe	4	4	4	1	5	65,17
Sierra Leone	4	4	4	1	5	65,17
Ghana	4	5	3	1	5	67,42
Zimbabwe	4	4	5	3	5	71,91
Burundi	3	6	5	1	4	73,03
Malawi	4	4	6	2	5	75,28
Swaziland	4	4	6	2	5	75,28
Seychelles	4	6	4	1	5	78,65
Togo	4	5	6	1	4	79,78
Rwanda	5	6	3	2	5	84,27
Lesotho	4	6	6	2	5	86,76
Maurice Ile	5	6	4	2	5	86,76
Afrique du Sud	4	6	6	3	5	89,89

Table 4: Results of the cartographic Development Index for Africa.

Pays	Superficie	Date	Échelle	Thématique	Disponibilité	IDC
Nicaragua	1	2	2	1	1	11,24
Cuba	1	2	2	2	2	13,484
El Salvador	1	2	2	2	3	14,64
Argentine	2	2	2	3	5	26,97
Honduras	1	4	4	2	3	37,08
Grenade	1	4	4	3	5	40,45
Brésil	3	2	3	4	5	41,57
Paraguay	1	4	6	1	4	46,07
Haïti	2	4	4	2	5	48,31
Venezuela	3	4	2	4	5	50,56
Pérou	3	4	3	3	4	52,81
Costa Rica	4	1	6	2	5	55,06
Chili	3	5	2	4	5	57,30
Moyenne 57,91%						
Uruguay	3	5	3	2	5	59,55
Barbade	2	6	4	1	5	60,67
Jamaïque	2	6	4	2	5	61,80
Antigua-et-Barbuda	4	4	4	1	5	65,17
Bahamas	4	4	4	1	5	65,17
Dominique	4	4	4	1	5	65,17
Équateur	4	4	4	1	5	65,17
Guatemala	3	4	6	3	3	65,17
Panama	3	6	6	2	5	66,29
Trinité-et-Tobago	4	4	4	2	5	66,29
Colombie	3	5	6	4	3	73,03
République dominicaine	4	4	6	1	4	73,03
Mexique	4	4	5	4	5	73,93
Belize	4	4	6	2	4	74,15
Bolivie	4	5	4	4	5	75,28
Guyana	4	4	6	4	5	77,53
Sainte-Lucie	4	6	4	1	5	78,65
Saint-Kitts-et-Nevis	4	6	4	1	5	78,65
Suriname	5	4	6	2	5	84,27
Saint-Vincent-et-les-Grenadines	5	6	4	1	5	87,64

Table 5: Results of the cartographic Development Index for Latin America and the Caribbean

Pays	Superficie	Date	Échelle	Thématique	Disponibilité	IDC
Maldives	1	2	2	1	5	15,73
Arabie Saoudite	1	4	1	2	3	23,60
Oman	1	5	1	2	1	23,60
République démocratique populaire de Corée (nord)	1	4	4	1	1	33,71
Chine	1	6	1	4	1	37,08
Yemen	2	4	4	1	1	42,70
Oman	2	5	3	1	1	44,94
Iran	2	5	5	4	1	57,30
Viet Nam	3	5	4	1	1	58,43
Cambodge	5	4	3	1	0	64,04
Laos	5	4	3	1	1	65,17
Mongolie	4	6	2	1	1	65,17
Thaïlande	3	4	6	4	3	66,29
Liban	4	4	4	3	5	67,42
Indonésie	4	6	2	4	1	68,54
Taiwan	4	5	4	2	1	68,54
Moyenne 69,91%						
Bangladesh	4	6	2	4	3	70,79
Malaisie	5	3	6	1	1	71,91
Pakistan	3	5	6	3	3	71,91
Hong Kong	5	4	4	2	5	75,28
Koweït	5	5	4	1	1	76,40
Brunéi	4	5	6	1	1	76,40
Émirats Arabes Unis	4	5	6	2	1	77,53
Papouasie Nouvelle-Guinée	5	5	3	3	5	78,65
Macao	4	6	4	1	5	78,65
Jordanie	5	6	3	2	1	79,78
Népal	4	6	6	4	3	79,78
Inde	4	6	4	4	3	79,78
Afghanistan	5	6	3	3	1	80,90
République de Corée (sud)	5	4	6	2	3	82,02
Sri Lanka	2	6	4	4	3	82,02
Russie	5	6	3	3	3	83,15
Turquie	5	4	6	3	3	83,15
Brunei	4	6	6	1	3	85,39
Bahreïn	5	6	4	2	5	89,76
Singapour	5	6	4	2	5	89,76
Philippines	5	6	4	3	5	89,89
Iraq	5	6	6	2	1	93,26
République Arabe Syrienne	5	6	6	2	1	93,26
Qatar	5	6	6	2	5	97,75
Israël	5	6	6	3	5	99,88

Table 6: Results of the Cartographic Development Index for Asia/Middle East.